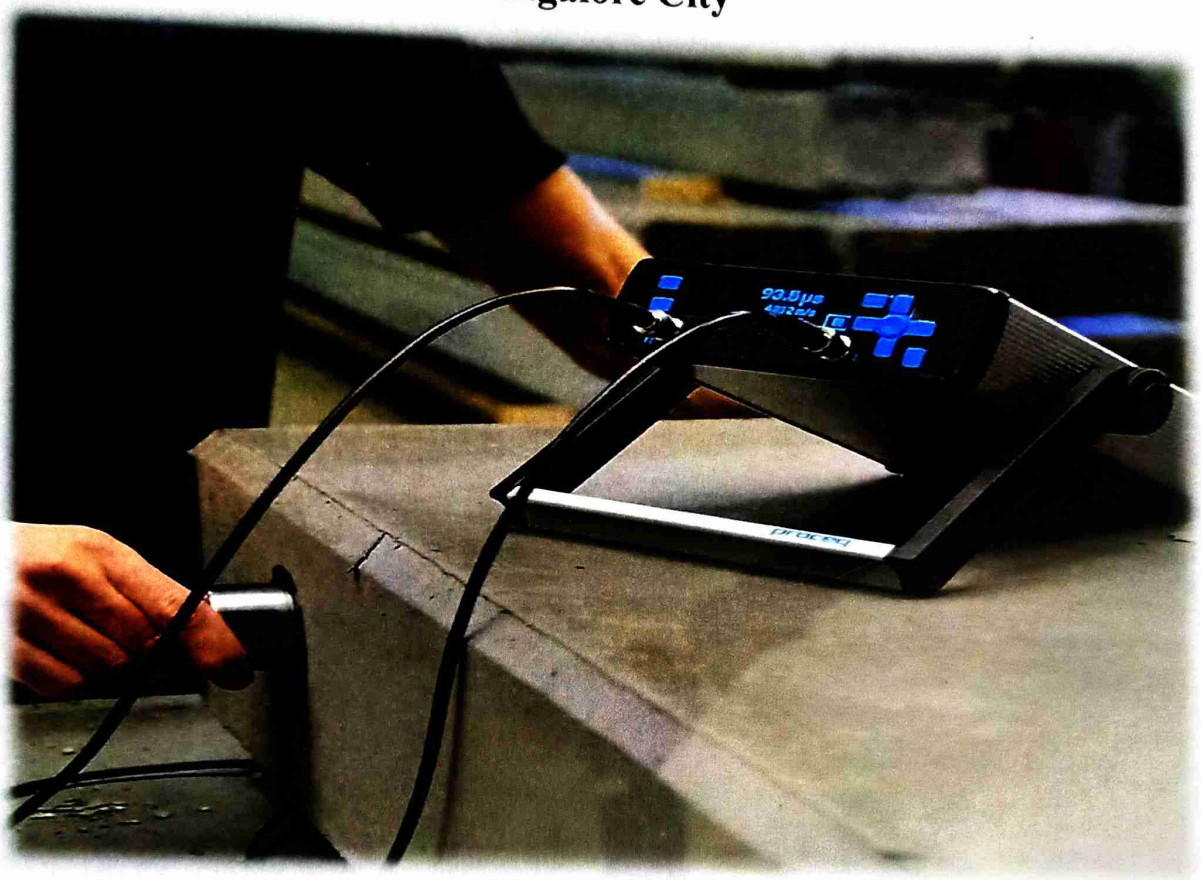
ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ
Bruhat Bengaluru Mahanagara Palike

White Topping of Road from Sheshadripuram First Grade College to Aroma Bakery Junction via 3rd A cross Road,1st A Main Road,16th B Cross Road Roads at Yelahanka New Town in Bangalore City



Non-Destructive Test

Contractor:-

M/s NCC

#301 Batavia Chambers, 8 Kumara Krupa Road, Kumara Park East, Bengaluru - 560 001, Tel.: +91 80 2225 8991 / 3309

Consultant :

DAS CONSULTANTS

#60, 4th Cross, Telecom Layout, Bangalore - 560097

Email: dasconsultants123@gmail.com

White Topping of Road from Sheshadripuram First Grade College to Aroma Bakery Junction via 3rd A cross Road,1st A Main Road,16th B Cross Road Roads at Yelahanka New Town in Bangalore City

NON-DESTRUCTIVE TEST

March 2024

Prepared by: Bhansi Das. (Bhansi Das –NDT Engineer) 02 / 02 / 2024

Reviewed by: (Harsha – Manager) 02 / 02 / 2024

Approved by: (Sunil –Director) 02 / 02 / 2024

ABSTRACT OF TEST CONDUCTED

Name of Project :- **White Topping of Road from Sheshadripuram First Grade College to Aroma Bakery Junction via 3rd A cross Road,1st A Main Road,16th B Cross Road Roads at Yelahanka New Town in Bangalore City**

Client:- **NCC Ltd,**

#301 Batavia Chambers, 8 Kumara Krupa Road,
Kumara Park East, Bengaluru - 560 001,
Tel.: +91 80 2225 8991 / 3309
info@nccltd.in

Report on:- **Ultrasonic Pulse Velocity Test on**

PQC
RCC Drain Wall
RCC Drain Slab
Kerb

Rebound Hammer Test on

PQC
RCC Drain Wall
RCC Drain Slab
Kerb

Date of Testing:- 02.03.2024

Test carried out by:- Mr. Bhansi Das, Lab Technician

Test Witnessed by:- **Yadhu Krishna**, AEE, QA & QC Dept.
Sundaresh, AEE, Yelhanka
Balasubrahmanian, DGM, NCC

Method Statement

1.0 Ultrasonic Pulse Velocity Test

AIM: -To determine the homogeneity of the concrete, presence of cracks, voids and other imperfections, the quality of the concrete in relation to standard requirements, the quality of one element of concrete in relation to another and the values of dynamic elastic modulus of the concrete.

APPARATUS: -

- Electrical Pulse Generator
- Amplifier
- Electronic Timing Device

PROCEDURE:

Coupling Transducers

A good acoustic coupling between the concrete surface and the face of the transducers is essential for reliable results

- Coupling is provided by a medium such as petroleum jelly, liquid soap or grease
- Air pockets must be eliminated, and it is important that only a thin separating layer exists-any surplus must be squeezed out
- A light medium such as petroleum jelly or liquid soap is found to be the best for smooth surfaces
- A thicker medium such as grease is recommended for rough surfaces which have not been cast using smooth shutters
- In case of very rough or uneven surfaces, grinding or preparation with plaster of Paris or quick-setting mortar may be necessary before coupling

Following are three basic ways in which the transducers may be arranged: –

a. Transducers coupled on opposite faces (direct transmission)

b. Transducers coupled on adjacent faces (semi-direct transmission)

c. Transducers coupled on same faces (indirect transmission)

- The above-mentioned arrangements of transducers are shown below:

I. Direct transmission:

The direct method is the most reliable from the point of view of transit time measurement as well as path length measurement.

II. Semi- Direct transmission:

The semi-direct method is less reliable than the direct method and should only be used if the angle between the transducers is not too great, and if the path length is not too large.

III. Indirect Transmission

The indirect method is the least accurate because received signal is subject to errors due to scattering of pulse by discontinuities.

Determination of pulse velocity

A pulse of longitudinal vibration is produced by an electro acoustical transducer, which is held in contact with one surface of the concrete member under test. After traversing a known path length (L) in the concrete, the pulse of vibration is converted into an electrical signal by a second electro-acoustical transducer and electronic timing circuit enable the transit time (T) of the pulse to be measured. The pulse velocity (V) is given by

$$V = L / T$$

Where, V = Pulse velocity; L = Path length; T = Time taken by the pulse to traverse the path length.

Interpretation of Results

The ultrasonic pulse velocity of concrete can be related to its density and modulus of elasticity. It depends upon the materials and mix proportions used in making concrete as well as the method of placing, compacting and curing of concrete. If the concrete is not compacted thoroughly and having segregation, cracks or flaws, the pulse velocity will be lower as compare to good concrete, although the same materials and mix proportions are used. The Concrete quality grading of concrete in terms of uniformity can be assessed using the guidelines given in table below:

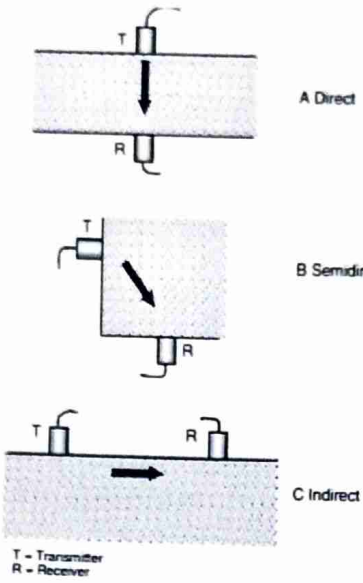
Velocity Criterion for Concrete quality grading

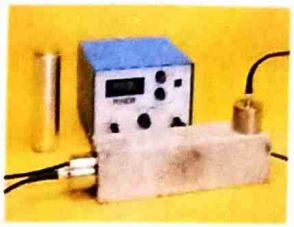
(As per Table 1 of IS 516 Part 5 Sec 1:2018)

SI No.	Average Value of Pulse Velocity by Cross Probing (km/sec)	Concrete quality grading
1.	Above 4.40	Excellent
2.	3.75 to 4.40	Good
3.	3.00 to 3.75	Doubtful*
4	Below 3.00	Poor

Note: In case of Doubtful Concrete quality grading it may be necessary to carry out further tests.*

PHOTOS: -





SEMI-DIRECT TRANSMISSION

DIRECT TRANSMISSION

ULTRASONIC PULSE VELOCITY ARRANGEMENT AND APPARATUS

2.0 Rebound Hammer Test

AIM: -To assessing the likely compressive strength of concrete with the help of suitable correlation between rebound index and compressive strength.

APPARATUS: -

- Rebound Hammer

PROCEDURE: -

- The following should be observed during testing.
  - The surface should be smooth, clean and dry
  - The loosely adhering scale should be rubbed off with a grinding wheel or stone, before testing
  - Do not conduct test on rough surfaces resulting from incomplete compaction, loss of grout, spalled or tooled surfaces.
  - The point of impact should be at least 20mm away from edge or shape discontinuity.
- Before commencement of a test, the rebound hammer should be tested against the test anvil, to get reliable results.
- For taking a measurement, the hammer should be held at right angles to the surface of the structure. The test thus can be conducted horizontally on vertical surface and vertically upwards or downwards on horizontal surfaces.

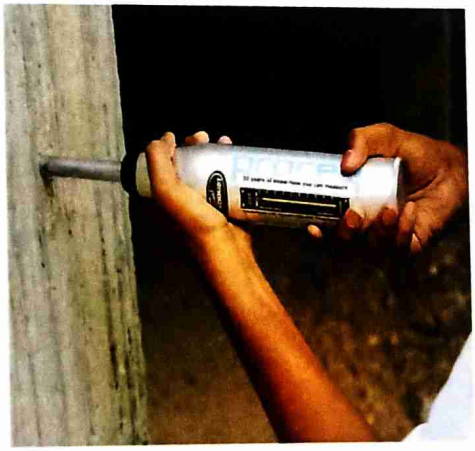
- Various positions of Rebound Hammer:
- Horizontal Position; Vertical upward position; Vertical downward position
- If the situation so demands, the hammer can be held at intermediate angles also, but in each case, the rebound number will be different for the same concrete.

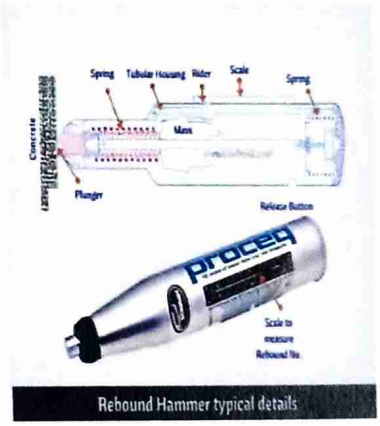
INTERPRETATION OF RESULTS: -

After obtaining the correlation between compressive strength and rebound number, the strength of structure can be assessed. In general, the rebound number increases as the strength increases and is also affected by a number of parameters i.e. type of cement, type of aggregate, surface condition and moisture content of the concrete, curing and age of concrete, carbonation of concrete surface etc. Moreover, the rebound index is indicative of compressive strength of concrete up to a limited depth from the surface. The internal cracks, flaws etc. or heterogeneity across the cross section will not be indicated by rebound numbers.

As such the estimation of strength of concrete by rebound hammer method cannot be held to be very accurate and probable accuracy of prediction of concrete strength in a structure is ± 25 percent

PHOTOS: -





Rebound Hammer typical details

REBOUND HAMMER ARRANGEMENT AND APPARATUS

TEST REPORT

REBOUND HAMMER TEST

DAS CONSULTANTS

(Non-Destructive Tests)

FIELD TEST FORMAT-REBOUND HAMMER TEST

IS 516: Part 5: Sec4:2020

Member Identification:	RCC Structures	STRUCTURE DETAILS
Test Date :	02-03-2024	Drain Slab, PQC, Kerb, Drain Wall

Sl. No.	Location	Readings Taken	Average Reading	Compressive Strength (N/mm2)	Test Method
1	Drain Slab	42	40	48	Vertically Downwards
2		48			
3		46			
4		32			
5		36			
6		36			
7	PQC	50	50	68	Vertically Downwards
8		50			
9		59			
10		54			
11		40			
12		48			
13	Kerb	36	37	42	Vertically Downwards
14		36			
15		38			
16		36			
17		36			
18		38			
19	Kerb	32	35	40	Vertically Downwards
20		34			
21		32			
22		38			
23		38			
24		36			
25	Drain Wall	48	45	52	Horizontal
26		48			
27		48			
28		48			
29		38			
30		40			
31	Drain Slab	32	34	38	Vertically Downwards
32		34			
33		34			
34		34			
35		36			
36		36			
37	Kerb	36	36	40	Vertically Downwards
38		36			
39		36			
40		36			
41		36			
42		36			
43	Drain Wall	38	38	39	Horizontal
44		36			
45		36			
46		38			
47		40			
48		40			

Sl. No.	Location	Readings Taken	Average Reading	Compressive Strength (N/mm2)	Test Method
49	Drain Wall	42	40	42	Horizontal
50		40			
51		38			
52		40			
53		40			
54		38			
55	Drain Slab	40	35	40	Vertically Downwards
56		32			
57		32			
58		36			
59		30			
60		42			
61	Kerb	38	36	40	Vertically Downwards
62		36			
63		36			
64		36			
65		36			
66		36			
67	PQC	52	46	60	Vertically Downwards
68		40			
69		42			
70		42			
71		50			
72		52			
73	PQC	38	40	48	Vertically Downwards
74		48			
75		32			
76		36			
77		40			
78		48			

ULTRASONIC PULSE VELOCITY TEST

DAS CONSULTANTS
(Non-Destructive Tests)

FIELD TEST FORMAT-ULTRASONIC PULSE VELOCITY

IS 516(Part-5 Sec 1):2018

Member Identification:	RCC Structures	STRUCTURE DETAILS	
Test Instrument:	PL-200	Drain Slab, PQC, Kerb, Drain Wall	
Date of Test	02.03.2024		

Sl. No.	Structural Member	Path length	Time Taken (Micro Second)	Pulse Velocity (Km/Sec)	Avg.Pulse Velocity (Km/Sec)	Quality	Method
1	PQC	150	39.8	3.77	3.95	Good	Indirect
		300	75.6	3.97			
2	PQC	150	36.6	4.10	4.10	Good	Indirect
		300	70.2	4.27			
3	Drain Slab	150	38.2	3.93	4.07	Good	Indirect
		300	71.8	4.18			
4	Drain Slab	150	36.5	4.11	4.09	Good	Indirect
		300	78.6	3.82			
5	Drain Wall	150	34.5	4.35	4.13	Good	Indirect
		300	77.8	3.86			
6	Drain Wall	150	35.9	4.18	4.08	Good	Indirect
		300	75.2	3.99			

TEST RESULT

3.0 Test Results and Conclusion.

ULTRASONIC PULSE VELOCITY TEST

From the results of the Ultrasonic Pulse Velocity Test, it is inferred that the average UPV test values for the above structural elements RCC Drain Slab, PQC, Kerb, Drain Wall are under the range Between 3.95Km/s to 4.13Km/s and the Concrete Quality Grading indicates "GOOD" as per Amendment (Nov 2019) to Table 1 of Clause 2.5.2 of IS: 516 (Part 5/Sec1): 2018.

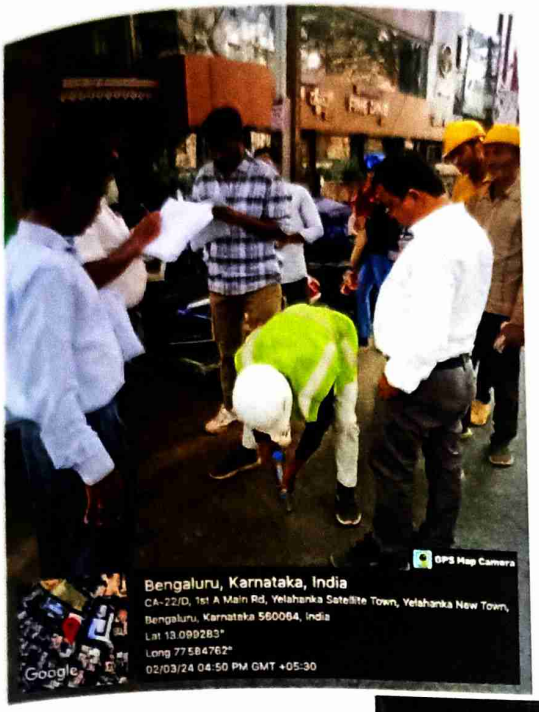
REBOUND HAMMER TEST

From the results of the Rebound Hammer Test, it is inferred that the average Rebound test values for the above structural elements RCC Drain Slab, PQC, Kerb, Drain Wall are under the range between 38 to 58 N/mm2 Compressive Strength and the Concrete Quality Grading indicates "GOOD" as per IS 516: Part 5: Sec4:2020.

SITE PHOTOS

Site Photos

Ultrasonic Pulse Velocity & Rebound Hammer Test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02/03/24 04:50 PM GMT +05:30
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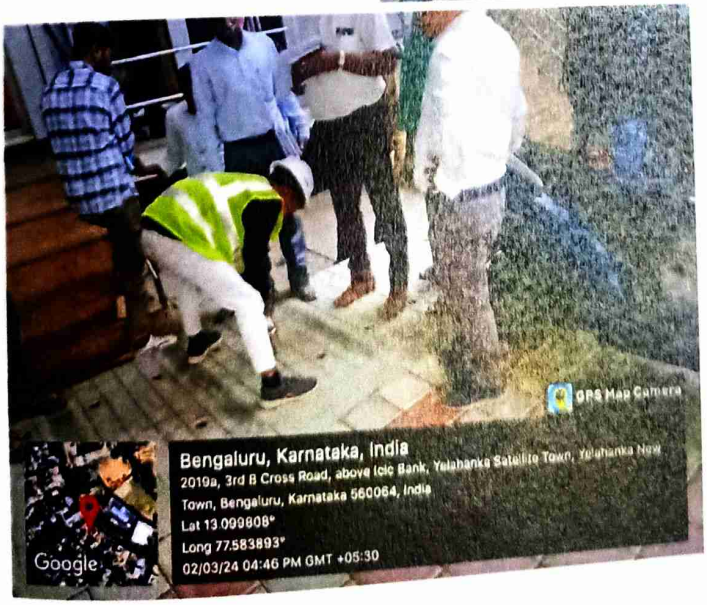
GPS Map Camera
Bengaluru, Karnataka, India
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Long 77.583893°
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